

Requirements for Electric Service Connection

SEATTLE CITY LIGHT

1996

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Customer Engineering

GENERAL INFORMATION: RESIDENTIAL AND COMMERCIAL ACCOUNTS

NORTH OF DENNY WAY	517-3272
SOUTH OF DENNY WAY	654-2720

LARGE COMMERCIAL AND INDUSTRIAL SERVICE INFORMATION

NORTH OF PIKE STREET (1500 Block)	684-3102
PIKE STREET (1500 Block) TO YESLER WAY	684-3252
SOUTH OF YESLER WAY	684-3101

COMMERCIAL AND INDUSTRIAL ENERGY CONSERVATION	684-3095
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STREET AND ALLEY LIGHTING

NORTH OF DENNY WAY	517-3272
SOUTH OF DENNY WAY	654-2720

FLOODLIGHTING	654-2746
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METERING

NORTH OF SHIP CANAL & QUEEN ANNE/MAGNOLIA	684-4254
SHIP CANAL (East of Aurora) TO SPOKANE STREET (3500 Block)	684-4915
SOUTH OF SPOKANE STREET (3500 Block)	684-4267

COGENERATION/SMALL POWER PRODUCERS	684-3104
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(MAP)

RECENT CHANGES IN THE MANUAL

(Changes will be noted here. This page will be replaced each time a new change is introduced.)

June 29, 1999

NOTES

FOREWORD

This manual has been written to provide City Light customers with a concise reference to the requirements that must be met before the Utility can provide electric service. They are based on standards established to ensure the safe and efficient use of electric energy.

Companion publications include *Cogeneration & Small Power Producers Information*.

Please contact your Customer Engineering Office or Account Executive if you have questions. Reference copies of these manuals are available at Public Library branches in our service area, at the downtown City Light office, and at the North and South Service Center offices.

(The requirements are published by the Utility in accordance with Ordinance 117490, or as this ordinance may be amended or superseded.)

Please Note: If there are conflicts between the National Electric Code and/or the Seattle Electrical Code and these Requirements, the Codes will take precedence.

NOTES

1.0 GENERAL REQUIREMENTS FOR ELECTRIC SERVICE

This section covers the basic procedural and technical requirements for electrical service connection. For your convenience, this section is divided into two parts: the first includes advance notice and procedures, while the second part covers those general technical requirements that ensure safe and reliable electrical service.

1.1 Advance Notice and Procedures

City Light will connect your service only after all general and technical requirements have been met.

1.1.1 Advance Notice

If you want a new or additional electric service, you **must** contact City Light's Customer Engineering Units well in advance to determine what kind of service is available at your building site.

Voltage, Phase, and Route of Service We reserve the right to determine the voltage, phase, and the route of service.

Lead Time We may need up to 18 months advance notice if your new service makes it necessary to procure special equipment, do major engineering, or to extend our distribution system. We will not order any of the necessary equipment until adequate load information has been provided and a contract has been signed.

Secondary Underground Service If you're planning a new underground service, contact your Customer Engineering office for the terminal box, conductor, conduit, and handhole requirements.

Disconnect If you need to have your service or meter disconnected, please call us forty-eight (48) hours in advance so we can schedule the work. Large services and on-site transformers can take longer to disconnect.

Easements. Where service easements will be required (e.g., when service lines cross one lot to serve another), you must contact your Customer Engineering office at least three months before the planned service date. For details of easement requirements, see Section 2.

Clearance. You must maintain required clearances from our wires at all times. Refer to Section 3 of this book and City Light Clearance Guidelines for details. It is your responsibility to notify us well in advance of starting construction to arrange for proper line clearance.

Connection. You need to notify us when the Seattle City Department of Construction and Land Use (inside Seattle) or the State Department of Labor and Industries (or other agency) outside Seattle has approved your service for connection.

Three-Phase Motors. For advance information requirements, see Section 11.2.4.

1.1.2 Submission of Plans

Advance notice requirements are in Section 1.1.1. Section 11.1 covers submission of plans for motors and special equipment.

For commercial or industrial services (including triplex or larger multi-residential structures), you must submit a set of plans for our review and comment. This requirement applies to rewire and new services. The plan set must include:

A site plan showing:

- a. Any buildings on the property
- b. Street designations, and address
- c. Proposed location of service entrance, switchgear, and meter centers
- d. "North" or direction arrow
- e. Property boundary designations
- f. Legal descriptions (as required)

A load summary and panel schedule

A riser diagram showing:

- a. The size of the main disconnect or bus
- b. A detailed sketch of the proposed route of service conductors from the service termination point to the main disconnect or bus
- c. The size, type, and number of service conductors
- d. Provisions for metering

Electrical plans for all houseboat, boat moorage and mobile home installations must be submitted to us for approval.

1.1.3 Location of Conductors and Service Equipment

Before you install any equipment for overhead service, we need to agree to:

- a. The point where service wires will be attached
- b. A path for the service wire
- c. The location of the meter
- d. The location of service poles, including any poles that may be required for service drops longer than 150 feet. (Service Pole requirements are covered in Section 7.2.)

1.1.4 Contracts

You may be required to sign a service contract before service is connected. This may sometimes be done via telephone.

1.1.5 Access to Utility Equipment

We must have access at all times to your meter for reading, servicing, repair, and replacement

We must have vehicular (truck) and heavy equipment access at all times to all vaults, transformer pads, and substations that are located on your property for equipment servicing, repair, and replacement. This includes at least 10 feet of overhead clearance, if applicable, and a surface adequate to support the equipment.

We must have access at all times to secondary junction boxes, if any, on your property.

Access must be available by:

- a. Being free and open to access at all times, or
- b. Having an attendant on duty at the premises at all times, or
- c. Having a key box for our use, which contains the necessary key(s) for ready access.

Key boxes provided for the purpose of reading and maintaining meters may be supplied and installed by you. If you choose, we will provide and install the key box and bill you. Key boxes provided for the purpose of inspecting, maintaining, and repairing our equipment, other than meters, must be supplied and installed by us.

Vault and Primary switchgear room doors must be equipped with a self-locking lockset that will accept a Best Universal Lock Co. core. We will provide and install the core.

Elevator service must be provided to any building level where a transformer vault is located. Exceptions to this requirement must be agreed to in writing before vault construction.

Location. All vaults and pad-mounted transformers must be located so as to provide safe access and code clearances from fire escapes, combustible materials, and other hazards, in accordance with the requirements of the appropriate City, County or State

inspecting authorities.

Vegetation. Vegetation must not be permitted to grow inside fenced areas for transformers or to block access to other Utility equipment.

1.1.6 Permits

You are responsible for obtaining any necessary permits from the Seattle Department of Construction and Land Use (inside Seattle), the City of Seatac Public Works Department (in Seatac), the City of Tukwila Public Works Department (in Tukwila), or from the State Department of Labor and Industries (elsewhere in our service area).

Underground Inside Seattle, where underground conduit is to be installed, or where ditching is to be done in public streets or alleys by you or your contractor, permits must be obtained by you or your contractor from the City Engineer's office. For work in Seatac or Tukwila, contact their Public Works Departments. Elsewhere in our service area, we get the necessary permits from King County and perform all the civil construction work in the public right-of-way. You will be billed for the permit and work.

Fees. You must pay all permit and inspection fees.

1.1.7 Multi-Unit Structures

Unit Identification. Prior to meter installation, all separately metered spaces and their meter socket must be identified by final space or unit number, letter designation, and/or street address. If numbering the spaces is not practical prior to meter installation because of construction requirements, you must provide us with two (2) copies of the final floor plan. This plan must clearly show the final unit numbers, letters, and/or street addresses of each separately metered space. You must sign this plan sheet, authorizing us to charge for any costs incurred if the numbers differ at the building's completion.

After service connection, the building owner must notify us in writing of any changes in building address or unit identification. Failure to notify us of changes in unit designations or building address may subject the owner to utility charges.

Master Metering

Master metering is prohibited for any new or additional services to duplex, multiple dwelling buildings or dwelling units for the purpose of metering the electrical energy usage of the dwelling units, a central space heating system, or a central domestic water heating system.

Master metering is also prohibited for any enlarged services to duplex, multiple dwelling

buildings or dwelling units for the purpose of metering the electrical energy usage of the dwelling units or a central space heating system.

We will not energize a new service supplying electrical power to dwelling unit(s), space heating, or domestic water heating which is not isolated and separately metered for each unit. Neither will we energize an enlarged service supplying electrical power to dwelling unit(s) or a space heating system which is not isolated and separately metered for each unit.

Master metering is required for boat moorages but prohibited for houseboats.

1.1.8 Approval

We will not connect your service conductors until the Electrical Inspector from the Seattle City Department of Construction and Land Use (inside Seattle) or the State Department of Labor and Industries, or other agency (outside Seattle) has approved the service for connection and the service has met our requirements.

In the case of underground service, all vaults, handholes, transformer pads, and conduit work must be inspected and approved by us before backfilling.

1.1.9 City Light's Rights and Responsibilities

Service Connection. Upon completion of your responsibilities, we will make a permanent service connection.

Charges. We must determine charges for service work. (See Department Policy and Procedure 500 P III-417).

Routing and Type of Service. We will provide you with information concerning the type and route of service, voltages, phases, and maximum available fault current in any given area. We reserve the right to determine the availability of voltage, phase, and the route of service.

1.2 Technical and Special Service Requirements

This section gives the basic technical limits of the service provided by us and the general limitations applicable to specified service areas.

Additional limitations and more detailed specifications are listed in other sections of the manual.

1.2.1 Limits of Service and Service Equipment

Only nominal 60 Hz alternating current is available.

All metering shall be at the service voltage, unless other arrangements are agreed to in writing.

Our stock of transformers for supplying standard voltages consists of oil-filled, non-PCB types only.

1.2.2 Special Technical Provisions

We reserve the right to impose special requirements for unusual service installations.

Your electrical load must be balanced between phases to a level acceptable to us.

An oxide inhibitor must be used when terminating stranded Aluminum conductors.

Special voltages. If you require voltages or phases other than those available, you must supply the necessary equipment and space for it. All such equipment must be installed on your side of the meter, unless otherwise agreed to in writing.

Interference. Whenever your equipment causes interference with your own service or that of other customers, We may require you to provide (and pay for) special equipment that will correct the interference. Interference problems may arise when:

- a. You need voltage control within unusually close tolerances,
- b. There is an unbalance of single phase and three phase loads,
- c. Where you intermittently switch large loads on and off, such as electric boilers, heaters, or motors.

Requirements for motors, low power factor lighting, and welding equipment are given in Section 11.

Fault Current Limiters

When you install fault current limiters on the line side (the Utility's side) of the first disconnect or main breaker, you must install a current limiter enclosure that meets the requirements below:

- a. The enclosure shall be sealable and separate from our service termination point. Your weatherhead, service terminal box, meter socket, or current transformer enclosure is not an acceptable location.
- b. The current limiter enclosure shall be clearly marked "fault current limiters," and it may not be used for any other purpose, such as a connection point for taps or extensions.
- c. you are responsible for maintaining and replacing fault current limiters. If repair or maintenance operations require us to temporarily disconnect the service, you will be billed for our labor. After any maintenance operation, you must notify us for replacement of meter seals.

1.2.3 Limitations Applicable to Specified Service Areas

Overhead service will not be installed in Local Improvement Districts, Road Improvement Districts, undergrounded arterials, voluntary underground areas, ordinance underground areas, or network areas. The main downtown business district, the University business district, and First Hill are served from underground network distribution systems. Other areas may be in the process of being converted to such systems or may be in the planning stages for conversion.

We will not upgrade existing overhead distribution on houseboat piers. If additional loads require an upgrading, you will be responsible for:

- a. Submitting plans of the proposed design for our approval,
- b. Contracting the work,
- c. Maintaining the distribution system supports as shown in Section 6.11, and
- d. Complying with provisions of Section 6.11.

1.2.4 Closed Transition Transfer Switches

Closed transition transfer switches are not permitted in underground network distribution areas.

Approval. All specifications and drawings of the closed transition transfer switch shall be submitted to us prior to construction.

The information shall include one-line and three-line diagrams showing all electrical equipment and protective devices. All equipment and devices shall be identified by function, rating, manufacturer's catalog number, and shall include installation and operation manuals, specifications, operating features and settings.

Means of Disconnection. There must be a disconnect on the line side of the transfer switch. The disconnect must have a visible break and must have provisions to lock in the open position only.

We must have 24-hour access to the disconnect. You must immediately notify us in writing whenever the access route or operating procedures change.

Frequency, Phase and Voltage

Frequency. The Utility's frequency is 60 Hz nominal. (See Section 1.2.4).

Waveform. The generator must deliver a sinusoidal waveform during transfer switch operation.

Voltage Magnitude. The voltage magnitude at the emergency supply terminal of the transfer switch shall be the same as that of the Utility's at the service terminal point during transfer switch operation. The service voltage is determined by City

Light.

Phase Sequence. The phase sequence of the voltage at the emergency supply terminal of the transfer switch must be the same as that of the Utility's at the service terminal point.

Phase Voltage. The phase voltage at the emergency supply terminal of the transfer switch must be in phase with that of the Utility at the service terminal point during transfer switch operation.

Maintenance of Equipment. The transfer switch and all related equipment must be furnished, installed and maintained by you, and must be capable of withstanding and interrupting the maximum fault currents specified by us.

You must provide us with a schedule of routine maintenance to be performed, and make available for our inspection, the maintenance record showing that it was done.

Protective Equipment. During the time your emergency power system is connected to the Utility's service terminal point via the transfer switch, protective devices are required to separate your emergency supply from the Utility's system for faults or low voltage on the Utility's system, or for faults on the customer's equipment. The devices and their settings shall be approved by us.

Our distribution feeders are subjected to automatic reclosing. Generally two reclosures may occur; the first will be within 2 seconds of the initial trip. Customers with synchronous machines are required to disconnect from the distribution system prior to the first reclose to protect their machine.

You are fully responsible for the protection of the load, the transfer switch, the emergency power system, and all associated equipment. Protection should be provided for all malfunctions or failures of your own equipment and consideration should be given to:

- a. Transient surges initiated by faults, lightning, switching, or other system disturbances.
- b. Generator overspeed or underspeed during operation of the transfer switch.

Protective relays. Protective relays shall protect the Utility system from phase-to-phase and phase-to-ground overcurrents on your emergency power system and shall disconnect your emergency system for faults or low voltage on our system.

Lockout Relays. You must provide lockout relays to prevent closing the transfer switch when either your emergency system or our system is not energized at its normal voltage or when the two systems are not synchronized.

Frequency Relays. You must provide one or more frequency relays to disconnect your

emergency system from the Utility's system when the frequency exceeds 62 Hz for 0.5 seconds or when the frequency falls below 59 Hz for 1.0 second.

Voltage Relays. You must provide voltage relays to disconnect the generator when the distribution voltage (on a 120-volt basis) exceeds these limits:

- a. When the voltage is 140 volts or more, the relay shall operate within 50 milliseconds (3 cycles);
- b. When the voltage is 130 volts or more for one second, the relay shall operate without intentional delay;
- c. When the voltage is 90 volts or less for one second, the relay shall operate without intentional delay.

Synchronization of Equipment. You must provide equipment for synchronizing the generator to the Utility system and protective relaying independent of the Utility system.

The synchronizing device must be installed to control the closing of the generator to the Utility system. The system parameters shall all be within these tolerances before closing:

Frequency difference less than 0.2 Hz;
Angular difference less than 5 degrees;
Voltage difference less than five percent.

Synchronous generators may be manually synchronized within these parameters, using automatic relay supervision. Synchro-check type relays are not acceptable.

Locks on Disconnect Switches. Provisions must be made for the installation by us of a Best Lock Company cylinder lock, or padlock, to lock the disconnect switch in the open position. The disconnect switch shall not be lockable in the closed position.

When de-energization of the in-building transformer vault is required, we will open and tag the required disconnect switch and lock it in the open position.

NOTES

2.0 EASEMENTS

2.1 Determination

2.1.1 Easements are required:

- a. Whenever our or your conductors must pass over, under, or through private property belonging to a third party;
- b. Where service equipment (such as poles and vaults) must be located on property belonging to a third party;
- c. Where we must locate our system or equipment on private property, as in the case of some primary service installations;
- d. Where a primary underground system serves more than one building on a property.

If an easement is required, you must contact us a minimum of three months before the desired service date. We will determine if easements are necessary. See City Light Department Policy and Procedure 500 P III-131 for additional information.

2.2 Property Description

We will write the legal description of the easement areas based on detailed information furnished by you concerning the proposed service or distribution system. If a survey is necessary, it shall be performed at your expense.

We will prepare final easement forms and give them to you or your designated agent for return and processing.

2.3 Verification

We will not connect your electrical service until:

- a. We have verified that the installations are within the boundaries of the easement areas. If the areas are not clearly defined, it is your responsibility to provide markers which allow us to complete the verification.

- b. All required easements have been legally executed and delivered us and we have reviewed and approved the easements for filing and recording.

NOTES

3.0 CLEARANCE REQUIREMENTS

This section gives the basic clearance requirements for underground and overhead services, both temporary and permanent. Clearance requirements for meters, switchboards, and vaults are in the Sections on Installation (7) and Meters (10). Please refer to Article 230 of the National and Seattle Electrical Codes for further information.

3.1 Overhead Clearance

3.1.1 Clear Path

The path between the service pole and the point of service attachment must be clear of all obstructions, including trees, branches, buildings, and other obstacles. If the path is not clear, you must arrange for clearance and pay costs. If the path is not clear because the conductors will run through or over property belonging to a third party, see Section 2, Easements, and Section 6.2.1, Direct Path.

3.1.2 Construction Clearance

You are required to maintain 10 feet minimum working clearance from all parts of building and construction equipment according to current General Safety and Health Standards (WAC 296-24-960). You must contact us well in advance of starting construction so that we can arrange proper procedures for working clearances and determine your costs.

3.1.3 Permanent Clearances

The standards for clearances from the ground and from buildings are in accordance with the National Electrical Code and National Electrical Safety Code (WAC 296.44).

Service drop conductors must maintain a minimum clearance of 3 feet from windows, doors, etc., except that conductors above the top level of the window may be less than the 3 foot requirement.

Clearances of service drop conductors above roofs and more than 3 feet from the edge of the roof must be a minimum of 8 feet except that for services of 240 volts or less clearance may be:

- a. a minimum of 3 feet if the roof slope is at least 4 inches in 12.
- b. a minimum of 18 inches above the roof overhang if not more than 4 feet of conductor passes over the roof or overhang.

Clearances of service drop conductors (including drip loops) above final grade must be:

- a. 10 feet for areas within 15 feet of the building accessible only to pedestrians if the service voltage is 240 volts or less.
- b. 12 feet for areas accessible only to pedestrians that are more than 15 feet from the building if the service voltage is 240 volts or less.
- c. 12 feet over residential driveways and commercial areas not subject to truck traffic.
- d. 18 feet over non-residential driveways, parking areas subject to truck traffic, streets, roads and alleys.

Clearance for service drop conductors through trees shall be a minimum of 3 feet.

3.1.4 Additional Poles

We may require a service pole and anchor on your property if a clear, direct route is not available or if the distance is greater than 150 feet from our pole to your point of attachment (see Section 7.2).

3.1.5 Maintenance

You are responsible for maintaining clearance around service wires on private property.

3.2 Underground Clearance

Please refer to these Construction Guidelines for information on trenching, utility separation, and conduit mandrelling.

U12-1.4 for installation details for underground services on private property.

U2-10 for installation details for underground services in public right-of-way.

U2-11.4.4 for a description of the mandreling and cleaning process for ducts and conduits.

4.0 TEMPORARY SERVICE

4.1 General Requirements

Time Limit. Temporary service installations are limited to a period of one year. An extension may be granted at our option.

Contracts. We will supply a temporary service connection on request. A signed contract with you may be required.

Electrical Permits and Inspections. You must obtain the required permit and undergo the required City or State inspections before service connection (see Section 1.1.6).

Installation Charges. Installation, removal, and relocation charges are explained in City Light's Installation Charges Policy 500 P III-417, Schedule 101, "Installation Charges for Temporary Services".

Equipment. You must provide temporary service entrance equipment.

Location of Connection. Temporary services may be installed on your work shed, building, pole, or post acceptable to us.

Length of Span or Conductors. Temporary service drops or underground runs are normally limited to 150 feet to the nearest Utility-designated service point. Special permission is required for additional length.

4.2 Overhead Service

Pole and Post Specifications. The service attachment must be able to withstand the strain of the service drop. Specifications for temporary posts are diagrammed in "Temporary Post Requirements," in the Appendix.

4.3 Underground Service

For temporary underground service, you must install a conduit riser at the temporary panel location and trench to a Utility-designated service stub, handhole, vault, or service pole. The "Temporary Post Requirements" diagram in the Appendix shows the basic trench and pole specifications. See Section 6 for general requirements for underground service.

Section 6.3.3 gives more information concerning temporary underground service.

NOTES

5.0 EFFICIENCY REQUIREMENTS

Your building may have to comply with the current City of Seattle or King County Energy Codes.
Contact your building inspector.

NOTES

6.0 TYPES OF SERVICE AVAILABLE

This section has information about the types of electrical service available and gives requirements pertaining to overhead, underground, and network service. The general requirements in Section 1 apply to all three service systems.

6.1 Number of Services, Phases and Available Voltages

6.1.1 Number of Services Available

One Service Rule. We will provide only one service to a site or structure; additional services will be supplied only at our option and after agreed to in writing.

If we need to add equipment to our system to provide a second service, you will be billed the full cost of that addition.

We reserve the right to deny requests for second service if the service would create a safety or reliability problem for us.

Mobile Home Parks. City Light will provide only one service to a mobile park.

Boat Moorages. City Light will provide only one service to a boat moorage.

6.1.2 Phases of Service

Single-phase, three-wire and three-phase, four-wire service can be provided. Three-phase, three-wire service is not available at secondary voltages.

Ordinarily, only single-phase service is available in residential areas, although three-phase service may be made available in certain residential areas at the customer's expense. Three-phase service is available in some suburban business areas.

6.1.3 Voltages Available

By definition, primary service is service of more than 600 volts; secondary is less than 600 volts. Primary service is available at various voltages, depending on the location. The nominal voltages for secondary service are 120 volts, 208 volts, 240 volts, and 480 volts. Call your Service Representative for information about the voltages available in your area.

Secondary Services At our option, the voltages listed in Table I may be supplied from the distribution system.

Primary Services Service at the Utility's distribution voltage or at intermediate voltages above 600 volts may be available in some locations. The nominal voltages which the Utility may supply for primary service are 26,400Y/15,000, 13,800/7960, 4,160Y/2,400, 4,160 delta and 13,200 delta. Please contact the Account Executive Unit for further information.

6.1.4 Current Limits Table I gives the maximum service entrance capacity (rating) at the various voltage levels that you may install without providing space on the premises for our step-down transformers.

Service Rating

The service rating shall be determined by the nameplate ampere rating of the main service disconnect.

In the absence of a single main service disconnect, the service rating will be the nameplate rating of the main service bus or the rating of the main bus in the service entrance panel, whichever applies.

In buildings where multiple services are connected from one service drop or service lateral, the service rating for the building shall be the aggregate of the individual service ratings as determined by paragraph a. or b. above.

Three-phase Service Services rated in excess of the single-phase limits shown in Table I must be three-phase.

Larger Services For services exceeding the ampacities shown in Table I, you will be required to provide the necessary facilities for installation of our transformers and associated equipment on your premises, unless other arrangements can be made that are satisfactory to us.

Multiple Services. Where more than one service is allowed as in Section 6.1.1, we reserve the right to limit the load and/or service ampacity on the additional service(s) to a level less than that allowed in Table I. The table will still apply to the first or original service.

Table I
MAXIMUM SERVICE ENTRANCE RATINGS
SECONDARY SERVICE

SERVICE VOLTAGE	MAXIMUM SERVICE RATING (Amperes)
Single-phase	
120/240 240/480 120/208 (Network) (1) 277/480 (Network) (1)	600 300 200 100
Three-phase	
208Y/120 (2) 240Y/138 (2) 480Y/277 480/240 Delta (3) 240/120 Delta (3)	1000 1000 600 300 600

- (1) Limitations indicated by the word "Network" in Table I apply only to the areas of the City served by the secondary network distribution systems.
- (2) If the service ampacity exceeds 800 amperes for secondary underground service, the customer may be required to provide one spare service conduit.
- (3) The maximum allowable service ampacities indicated here represent the total single-phase and three-phase loads combined. The customer will be required to connect all single-phase loads across the grounded phase, unless otherwise agreed to by the Utility.

6.1.5 Residential Exception to Load Limits

At our option, an exception to the maximum service amperes may be granted for 120/240 volt and 120/208-volt services for buildings which are used exclusively for residential occupancy. This exception will be in writing.

6.1.6 Transformation by Customer

If you require a voltage other than the standard voltages listed in Section 6.1.3, you must supply the equipment required. All special transformation equipment must be installed on the load side of the meter, unless otherwise agreed to in writing.

6.2 Overhead Service: Secondary and Primary

6.2.1 Secondary Overhead Service

Attachments. The service must be located so that not more than one point of attachment to the building will be necessary.

Direct Path. A direct path shall be provided that will avoid the necessity of a bridled service. A bridled service will be allowed only at our option, to avoid setting an additional pole or a trespass of other property.

Brackets and Masts. You must furnish and install approved service brackets and masts. Specifications for brackets and masts are in Section 7.2.

Maximum Distance. The maximum distance from our distribution pole to your point of attachment is 150 feet. For distances greater than 150 feet, a service pole is required. For further information concerning additional poles, see Section 7.2.

6.2.2 Primary Overhead Service

Division of Responsibility. For each primary overhead service, we will specify a point where our responsibility ends, and this point will be identified before construction. All facilities on your side of the division point will be furnished, installed, operated, and maintained by you unless an exception is agreed to in writing.

Span Length and Extensions. Our service will end within one span (150') inside your property line. Exceptions to this rule must be agreed to in writing. Should we agree to an extension, the following conditions will apply:

- a. The extension will be made by us and will remain our property.
- b. Maintenance of Utility-owned extensions will be provided at our expense.
- c. Exception. Extensions beyond a primary meter will be your property. Should we agree to install an extension beyond the meter, you must pay the full cost of all labor and materials. Maintenance of these customer-owned extensions will be furnished by the customer at their own expense.

Transformers

- a. When our transformers are placed on a pad or in a vault (any location other than a

pole) on your property, you are responsible for providing the vault, pad, conduits, and other equipment according to our specifications.

- b. We will furnish, install, and maintain transformers connected to the primary distribution system.

6.3 Underground Service

In general, we will require that you perform all necessary installation of trenches and conduits on your property. All underground services must be in conduit.

6.3.1 Plans and Specifications

Plans and specifications for all underground services must be submitted to us for approval.

6.3.2 Approval

The service installation must be approved by either the City or State Electrical Inspector for your site before we will connect the service. All trenching, vaults, handholes, and conduit work must be approved by the Utility before backfilling.

6.3.3 Customers' Responsibilities: City Light-Installed Service

Construction, Excavation, and Restoration on Private Property

All vaults, handholes, conduit work, ditching, backfilling, and restoration of property on private property must be done by and at the expense of the owner.

Openings in Building Walls

You are responsible for providing any necessary openings through the building wall and for sealing those openings after conduits have been installed. We are not responsible for any damage attributable to service conduit openings.

Water Entry Prevention: You are responsible to ensure against entry of water into buildings, into or through service equipment, or other locations where it is considered a problem.

Therefore, you are responsible for:

- a. Proper system design that considers differences in elevation and other contributing factors in order to prevent water from entering the building, service equipment, or other locations where there is a potential for equipment damage, electrical hazard, property damage, flooding, or other nuisance. (Our Service Representatives and Engineers can work with you in this area).

- b. Watertight grouting of conduit entrance at the building, vault, pad, or handhole.
- c. Watertight duct sealing for customer/contractor installed conductors which prevents water from entering service conduits.

Conduits/Conduit Specifications

All permanent underground service conductors shall be in conduit. Conduits you provide must be clear and unobstructed. For further requirements and recommendations concerning conduit installation, including specifications for conduit, bends, and trench depths, see Sections 7.3 and 7.4.

Temporary Underground Service

Where temporary underground service is necessary, you must install a conduit riser at the temporary panel location and trench to the Utility-designated service stub, handhole, vault, service pole or to the property line and pay our costs for supplying the temporary service. Refer to Department Policy and Procedure 500 P III-417, "Installation Charges," and 500 P III-424 for trenching in the public right-of-way. The "Temporary Post Requirements" diagrams in the Appendix show basic post and equipment specifications.

6.3.4 City Light's Responsibilities: City Light-Installed Service - We will:

Provide and install conductors from the designated point of service connection (on your property) to our service pole, handhole, or vault. You will be charged according to "Installation Charges," Policy 500 P III-417.

Near Side Service, provide and install all equipment and materials necessary to complete the service in the public right-of-way. (For customer responsibilities, see Sections 6.3.3 and 7.3.)

Far Side Service, excavate and install conduit from the designated point of termination at the property line to our distribution system on the far side of the right-of-way. Charges for such work will be made in accordance with the Utility's Installation Charge Policy, 500 P III-417.

6.3.5 Contractor-Installed Underground Service

See Section 7.3 for Customer Requirements when the customer contracts with a licensed electrical contractor to install service.

Inside Seattle, right-of-way permits for contractor installed service shall be obtained by you from the Seattle Engineering Department. In Seatac and Tukwila, right-of-way permits for contractor installed service shall be obtained by you from their Public Works Departments. Elsewhere in our service area, permits will be obtained by us from King County or the affected city. We will do all work in the public right-of-way and bill you for the costs for permits, inspection fees, and the construction work.

6.4 Underground Service in Overhead Distribution Areas: City Light-Installed Service

All underground services must be in conduit. Conduits you provide must extend from the meter socket, instrument transformer enclosure, terminal box, handhole, vault, or pad to the Utility-designated point on the property line.

For trench specifications, see Section 7.3.

6.5 Secondary Underground Service

6.5.1 Initiating Service

You must contact us for the following information:

- a. Terminal box requirements.
- b. Size, location, and arrangement of conduits entering the service terminal box.
- c. Meter location.
- d. Designation of the service pole, handhole, or vault and location of the conduits (including cable tv, telephone or other utilities) on the pole, in the public right of way in easement areas, or entering the handhole or vault.
- e. Length of customer's excess wire at the terminal box, handhole, or vault.
- f. Routing of service conduit and trench; depth and backfill specifications.

6.5.2 Secondary Underground Service in Network Areas

Aggregate service ampacity shall be limited to 1,000 amperes at 208Y/120 volts, 600 amperes at 480Y/277 volts, depending on which is available.

Where the service entrance ampacity exceeds 200 amperes at 208Y/120 volts or 100 amperes at 480Y/277 volts, the service must be three phase, four wire, and the load must be balanced.

In buildings served from an underground network system, you must install the necessary conduit to the Utility-designated point at the property line. We will extend this conduit to our service handhole or vault and install service conductors to the point of service connection designated by us.

6.6 Secondary Underground Service for Residential Structures

6.6.1 General

In areas where an underground distribution system currently exists, the Utility must be contacted for details (as in Section 6.5.1) and for special requirements of individual systems. For requirements applicable to residential structures in the First Hill and University District network areas, please see Section 6.6.3.

6.6.2 Requirements for Single-Family Residential Service: City Light Installation

Single family residential customers must provide and install the following:

For services 225 amperes or less, a 200-ampere, UL labeled, continuous duty rated meter socket with minimum dimensions of 11" x 14" x 4-1/8", having Al/Cu connectors designed for 4/0 aluminum conductors. The customer's wiring entrance into the meter socket must be offset from the Utility's so that the customer's wires do not physically block the entrance of the Utility's conductors, which enter the socket from below and connect to the top meter jaws. See U12-1.3 in the Appendix.

For services between 225 amperes and 400 amperes, an approved style 5 meter socket. See Section 10 for meter specifications.

For services over 400 amperes, an approved meter socket and current transformer enclosure. See Sections 9 and 10 for meter and enclosure specifications.

A trench and conduit from the Utility-designated point on the property line to the customer's terminal box, meter socket, or current transformer enclosure.

Backfilling, surface restoration, trench and conduit in the right-of-way, easement areas, and payment of street crossing charges (where required). Please see Section 6.3 for a review of these and other general requirements. See below for special requirements pertaining to network areas.

6.6.3 Special Provisions for Service to Residential Structures in the First Hill and University District Network Areas

The following services are available in these areas:

120/240 volt, single-phase service up to 225 amperes You must provide a concrete pad or space on the premises for our dry-type transformer. You must also install service conduit to a point on the property line designated by us. The transformer space and grounding must be approved by us and must be in compliance with the City of Seattle electrical code. Where 120/240-volt service is available directly from the network system, we may not require a transformer pad or space.

120/240-volt, single-phase service over 225 amperes is not available.

208Y/120-volt, three-phase service, 100-1,000 amperes The pad, space, and grounding provisions of this Section apply.

208Y/120-volt, three-phase service, over 1,000 amperes You must supply a transformer vault or space on the premises for our transformer(s), as well as service conduits to the property line as specified by us. The transformer vault must be approved by us and must be in compliance with the City of Seattle electric and building codes.

480Y/277-volt, single-phase service to 100 amperes You must install service conduit to a Utility designated point on the property line.

480Y/277-volt, three-phase service The basic requirements for secondary underground network service apply. See Section 6.5.2.

6.7 Primary Underground Service: General

6.7.1 Primary underground service is available from either the overhead, underground, or underground network distribution systems. Please consult the Advance Notice Section (1.1) and the General Section on underground services (6.3, especially 6.3.1) for requirements pertaining to the planning stages of primary underground service.

6.7.2 Specifications for vaults, handholes, vibration and noise levels, hoisting systems, buses, and access will be found in Section 7.5. Conduit and conductor specifications will be found in Section 7.0.

6.7.3 For each installation of primary underground service, we will establish the point where our responsibility ends and your responsibility begins. This division point will be identified before construction. All facilities on your side of this division point will be furnished, installed, operated, and maintained by you unless otherwise agreed to in writing.

6.8 Primary Underground Service in Overhead Areas: Special Requirements

For general requirements for underground service in overhead distribution areas, see Section 6.4. For general requirements for primary underground service, see Section 6.7.

6.8.1 Vaults, substations, or primary metering points will be located on the premises being served. You must furnish and install vaults, pads, and handholes in accordance with our specifications.

6.8.2 Collector Bus

If a collector bus is required, we will provide and install it in your transformer vault, at your expense.

6.8.3 Extensions to Additional Vaults

Please see Section 7.5.10. Transformers connected from our primary distribution system will be furnished, installed and maintained by us. Metering will be at the service voltage, unless otherwise agreed to in writing. Our transformation will be to a standard voltage; i.e., 208Y/120 volts, 480Y/277 volts, 4160Y/2400 volts, or 13,800Y/7960 volts.

6.8.4 Point of Division of Responsibility

Please see Section 8.0 for a full discussion of these requirements. In general, for each installation of primary underground service, we will establish the point where our responsibility ends and your responsibility begins. This division point will be identified before construction. All facilities on your side of this division point will be furnished, installed, operated and maintained by you unless otherwise agreed to in writing.

6.9 Primary Underground Service in Network Areas

6.9.1 Vault Requirement

Where the aggregate service entrance capacity exceeds 1,000 amperes at 208Y/120 volts or 600 amperes at 480Y/277 volts, you must provide a vault or other suitable facilities on your property for our transformer(s) and associated service equipment. Such vault or other facility for our transformer(s) must be located on the premises being served. The vault requirement for service ampacities over 600 amperes at 480Y/277 volts does not imply that services at 480Y/277 volts are available in the 208Y/120-volt network areas at less than spot network loading, as determined by us.

We will specify the number of conduits and size from the vault/switch room to the property line and our facilities.

6.9.2 Service Voltages Available

We will determine the available service voltage. It will be either 208Y/120 volts or 480Y/277 volts, three-phase, four wire.

6.10 Services Available to Mobile Homes

6.10.1 Mobile Home Parks

Approval. You must submit electrical plans for mobile home installations to us for approval.

General. We will supply one service to a mobile home park. Installation and maintenance beyond the service connection point will be your responsibility. Each mobile home must be individually metered. Meter locations must be accessible and meters may be grouped.

6.10.2 Mobile Homes on Individual Owner Lots

One Service Rule. City Light will supply one service to a mobile home lot.

Location of Service Equipment. The National Electric Code, Article 550-23(a), requires a power supply adjacent to the mobile home and not mounted in or on the

mobile home. For overhead service we will set a service pole and/or anchor, and you will be billed a service charge for labor and all materials furnished in accordance with the Installation Charges Policy 500 P III-417, Schedule 102, "Service Poles and Anchors on Private Property." You will also be charged for the service installation in accordance with policy 500 P III-417.

Where metering and service equipment are to be installed by you on a service pole approved for such use, refer to Section 10.5 for meter height requirements.

Underground Service. The general underground service and meter requirements apply. Please see Section 6.3 for information concerning underground service installations. Section 10.5 covers meter height requirements.

6.11 Houseboat Installations

6.11.1 Approval

You must submit electrical plans for houseboat installations to City Light for approval.

6.11.2 Termination Point of Utility Equipment

Our service for a single houseboat or houseboat pier will be terminated on shore in equipment acceptable to the City of Seattle Department of Construction and Land Use or the State Department of Labor and Industries. The termination equipment must also be approved by us.

6.11.3 Distribution of Power/Metering

The distribution of electrical service on a houseboat pier is the responsibility of the owner of the pier. Each houseboat must be individually metered with the meters located on the pier or shore.

6.11.4 Maintenance

For existing overhead service on houseboat piers, the wire and line hardware will be maintained by the Utility as long as the following standards are maintained:

- a. Supports mounted on driven piling must be furnished, installed, and maintained by the customer. These supports may be A-frames or individual poles.
- b. A-frame timber shall not be less than 6 inches by 5 inches or the equivalent.
- c. Poles must not be less than six (6) inches in diameter at the top.
- d. Adequate guying facilities must be provided for terminal supports at the end of the

pier and for changes in line direction.

- e. Crossarms and A-frame cross members shall be no less than 14 feet above the pier.
- f. Spacing along the dock between supports (A-frame or pole) should be approximately 30 feet.
- g. The customer's pier wiring for lighting must not be installed on the cross member or crossarm that supports the Utility's service conductors.

6.11.5 Upgrading Houseboat Pier Services

We will not upgrade existing overhead distribution on houseboat piers. If additional loads require upgrading of houseboat pier electrical distribution, it is your responsibility to do so and all provisions of Section 6.11 apply.

A new or upgraded distribution system on a dock or pier will be energized only when the following conditions are met:

The customer's system on houseboat piers shall comply with this manual.

The customer shall submit plans of the proposed design for approval.

The customer shall contract the construction of the distribution system on the pier.

The inspecting authority has approved the service for connection (see Section 1.1.8).

Our representative has inspected the construction and design of the system and has approved the system for connection.

- 6.11.6 Where unsafe conditions exist, service will be disconnected on shore until corrective action has been taken by the owner.

6.11.7 Houseboat Removal Charges

If it is necessary for us to disconnect electrical service to other houseboats in order to remove a houseboat, our labor must be paid by the requesting customer.

7.0 INSTALLATION: HARDWARE AND CONSTRUCTION REQUIREMENTS

This section gives the requirements and specifications for conductors, poles, masts, brackets, trenches, conduit, handholes, vaults, and some enclosures.

7.1 Conductors

7.1.1 Cost of Conductors. The cost of service conductors shall be charged in accordance with Installation Charges Policy 500 P III-417.

7.1.2 Height or Depth of Conductors. Clearance requirements are described on page 75 and in Construction Guideline U12-1.4 (see appendix). Houseboat pier support height specifications will be found in Section 6.11.

7.1.3 Conductor Specifications

Service entrance conductors for underground connections shall be any combination of the following wire sizes:

TABLE II

AL (Stranded)	CU (Stranded)
#1/0 AWG (outside network areas only)	#4 AWG
#4/0 AWG	#2 AWG
350 MCM	#2/0 AWG
400 (outside network areas only)	#4/0 AWG
500 MCM	350 MCM
600 (outside network areas only)	500 MCM
750 MCM	600 (outside network areas only)
	750 MCM

Service entrance conductors for overhead connections larger than 750 MCM shall not be used for service entrance except by special permission from us prior to commencement of work. Please note that an oxide inhibitor must be used with aluminum conductors.

7.2 Poles, Masts, and Brackets

Mobile home and houseboat specifications will be found in Sections 6.10 and 6.11.

7.2.1 Service Poles

Additional Poles. The Utility may require a service pole on the customer's property where:

- a. The distance from the Utility's service pole to the customer's point of service attachment is greater than 150 feet.
- b. A clear, direct route without trespass is not available for the service drop from the Utility's service pole to the customer's point of service attachment.
- c. The applicable code authority requires a service pole.

Service Pole Charge. We will install poles and anchors required for the reasons given in this Section. You will be billed a service charge according to Installation Charges Policy 500 P III-417, "Service Poles and Anchors on Private Property." See the waiver to this rule below.

Waiver of Service Pole Charges. If more than one customer is served from a pole on private property, an easement will be required to allow us to maintain our system, and there will be no charge to furnish and install the service pole.

Maintenance. We will maintain all poles and anchors that we install. We will not maintain poles installed by customers in mobile home parks.

Temporary Posts. For temporary post specifications, refer to the diagram in the Appendix.

7.2.2 Service Masts

Details of service mast installations are diagrammed in the Appendix. See also Section 7.2.3, below.

7.2.3 Brackets

General. Utility-approved service brackets must be furnished and installed by you. Brackets and their attachments must be capable of withstanding the tension of the service wires. The point of attachment must not be higher than 20 feet above grade, unless a variance is approved by us. See the Appendix for diagrams of Masts and Brackets, and bracket designs.

Bracket Bolts and Screws. Service brackets and channel brackets when attached to roofs or walls must be attached using corrosion-resistant carriage bolts not less than

3/8 inch in diameter. Bolt heads shall be inside the building to make it easier to remove the brackets for roof repairs, replacement, or other work. On rewire jobs, service brackets and channel brackets may be installed with lag screws which shall be not less than 3/8 inch by 4 inches.

- a. The distance between weatherheads served from the same service drop must not exceed 24 inches.
- b. The distance from the service bracket to the weatherhead(s) shall not exceed 24 inches.

Brackets on Masts. Where service brackets are attached to a service mast, the mast must be 2 inches or larger rigid steel conduit and must be located within three (3) feet of the roof edge. Please refer to diagrams in the Appendix for further information.

Excess Wire for Connection. Service entrance conductors shall have a minimum of 18 inches of wire extending from the weatherhead. Multiple service entrance conductors 500 MCM or larger shall have a minimum of 30 inches of wire extended. Conductors larger than 750 MCM shall not be used without special permission.

7.3 Trenches

7.3.1 Customer Responsibilities

On Private Property

All trenching, backfilling, and restoration on private property must be done by you at your expense. All installations must be inspected and approved by us before backfilling.

In the Public Right-of-Way

Contractor-Installed Underground Service:

- a. Inside Seattle, Tukwila, or Seatac, if you employ an electrical contractor to install a service (after having obtained our approval), your contractor is responsible for doing all required work in the right-of-way, including obtaining the necessary permit and paying permit and inspection fees (see Section 6.3.5).
- b. Elsewhere in our service area, we obtain the permit, pay the permit and inspection fees, and do all the required construction work in the right-of-way. You will be billed for all costs incurred by us.

If you elect to have us do all the service installation work in accordance with Installation

Charges Policy 500 P III-417, the near-side trenching alternatives will be as follows:

- a. When the Utility-designated terminal pole is beyond your property line boundaries (i.e. in front of other property), we will obtain the permit, pay the permit and inspection fees, and do all construction work in the right of way. You will be billed for all costs incurred by us.
- b. When the Utility-designated terminal pole is between your property line boundaries, and the service is inside Seattle, you have the option of either obtaining your own permit, paying the permit and inspection fees, and doing the trenching, backfilling, and restoration in the right-of-way, or electing to have us perform the work.
- c. When the customer inside Seattle elects to do the work in the right-of-way, conduit shall be installed from the meter to and ten (10) feet up the pole, or into the handhole or vault which we designate.

7.3.2 Permits

Refer to 1.1.6 of General requirements for Electric Service.

7.3.3 Temporary Service Trenches

For temporary service, you must install a conduit riser at the temporary panel location and trench to a Utility-designated termination point: service stub, handhole, pole, vault, property line, or service pole.

7.3.4 Trench Specifications

Specifications for service trenches are diagrammed in City Light Construction Guidelines U2-10 and U12-1.4 (see Appendix).

7.3.5 Street Crossing Charges

You must pay street crossing charges in accordance with Installation Charges Policy 500 P III-417.

7.4 Conduit, Bends, and Handholes

For general requirements for underground service and trenches, see Section 6.3 through 6.9 and 7.3.

7.4.1 General Specifications

Conduit specification diagrams will be found in the Construction Standards in the Appendix:

Conduit Entrance Details for Secondary Underground Service, U12-1.3

Conduit Risers on Poles with Conduit Specifications, U7-10, U7-10.1 and U7-10.2
Handhole Specifications and Installation, U2-13.1,
Installation of Direct-burial, Non-metallic, and Rigid Steel Conduit for Secondary Service, U2-10 (Right of Way) and U12-1.4 (Private Property)

7.4.2 Obstructions

Conduits must be clean, unobstructed and be provided with a pulling handline installed. We recommend that you mandrel the conduits after they have been installed. If we are unable to install conductors in customer-installed conduits, you will be required to make the necessary corrections and will be billed for any additional costs incurred by us. We will provide information concerning mandrel design and the mandreling process. See Construction Guideline U2-11.4.4 in the Appendix.

7.4.3 Conduit Over 250 Feet

If any conduit run is over 250 feet long, a pulling handhole may be required. We will determine handhole sizes and locations. For basic handhole diagrams see Guidelines U5-1.10 and U2-13.1 in the Appendix.

7.4.4 Bends

There must be no more than 225 degrees of bends (equals two 90-degree & one 45 degree bend) in any run of conduit between access points. Rigid galvanized steel bends must be used in bends. Exceptions to this rule will be at our option. A PVC Schedule 80 conduit bend at the pole base is allowed only if there are no more than 225 degrees in bends in the conduit run between access points and if the conduit run does not exceed 150 feet in length. For primary conductors, the minimum radius of a bend is three (3) feet, and for secondary conductors, the minimum radius of a bend is two (2) feet. In the network area, the minimum radius is to be four (4) feet for both primary and secondary conductors.

7.4.5 Conduit for Secondary Service

You must contact us for information concerning the size, location, and arrangement of conduits entering the service terminal box or current transformer enclosure. Any condulets (LB, etc.) used on the line side of the service must have a minimum opening of 9 inches and shall be sealable as determined by us.

7.4.6 Conduit Sizing for Current Transformer Meter Installations

For information concerning the types and sizes of conduit appropriate for connections between meters and current transformer enclosures, please refer to Section 10.

7.4.7 Special Transformation

See Section 6.6.3 and 12.4 for requirements concerning special transformer installations.

7.5 Vaults

7.5.1 General Requirements

Vaults, pads and handholes shall be furnished by you on your property in accordance with our requirements and specifications.

Switchgear Rooms. We may also require you to provide space for a primary switchgear room.

Code Compliance. You must satisfy all applicable building codes.

Inspection. We will inspect all vaults and pads during and after installation.

Construction Standard. All vault construction must be solid concrete or concrete-filled masonry units. Ceilings and floors must be solid concrete. The floor must slope 1 inch in 10 feet toward the sump.

7.5.2 Vibration and Noise Levels

You are responsible for isolating the transformer vault or pad so that sound and vibration levels satisfy the applicable laws and ordinances of the Washington Administrative Code, King County, and the City of Seattle.

7.5.3 Unrelated Systems

No pipe or duct system unrelated to the electrical installation can enter or pass through a transformer vault or substation. No customer-owned equipment for the customer's use will be allowed in the vault or substation, with the exception of air ducts for vault ventilation. Any fans required for forced air ventilation must be located outside the vault to allow customer maintenance.

7.5.4 Hoisting Systems for Heavy Equipment

Hoists. If the transformer vault on the customer property is located so that special hoisting or transporting facilities are necessary to remove, install, or maintain our equipment, you must maintain the hoisting and transport facilities in a manner approved, and with advisory assistance by us, you must transport our equipment to or from the point where we can use our normal equipment-handling methods. where necessary, an "Equipment Transportation Agreement" may be required. This agreement will become

a part of our service contract with you.

Elevators. Elevator service must be provided to any building level where a transformer vault is located. Exceptions to this requirement shall be agreed to in writing by us prior to vault construction.

7.5.5 Bus Termination

Where you use a service bus to which we connect service cable in a vault or substation, the bus shall be drilled for two-hole service cable terminal connectors. We will specify the hole size, spacing, location and number. We will furnish and install the terminal connectors for our service cables. Collector bus requirements for Primary Underground service in Overhead Distribution Areas are covered in Section 6.8.3.

7.5.6 Fire Code Clearance

Vaults and pad-mounted transformers must be located so as to provide code clearances from fire escapes, combustible materials, and unprotected doors and windows in accordance with the requirements of the appropriate building authority: King County or the City of Seattle Department of Construction and Land Use.

7.5.7 Access Requirements

Vault and primary switchgear room access doors must be equipped with a self-locking lockset that accepts a Best Universal Lock Company core. The core will be furnished and installed by the Utility. See also Section 1.1.5.

7.5.8 Ventilation

Vaults and primary switchgear rooms must be provided with adequate ventilation, as determined by us. Ventilation openings shall be located in order to provide code clearances from fire escapes, combustible materials, and unprotected doors or windows in accordance with the requirements of the appropriate inspecting authority, King County or the City of Seattle. If forced air ventilation is required, you must provide, install, and maintain the ventilation equipment. Forced air venting equipment must be installed to permit all maintenance to be performed from outside the vault. If a thermostat is required, it shall be located inside the vault. The thermostat shall be set to turn the fan on at 700 F and turn it off at 1400 F. When the temperature reaches 1400 F, an alarm (flashing light, bell, etc.) must come on to notify people that there may be a problem. See Section 7.5.3 for further information concerning forced air ventilation and unrelated systems in vaults and switchgear rooms.

7.5.9 Network Area Vault Requirement

In network areas, you must provide a vault or other suitable facilities for our transformer(s) when the aggregate service ampacity exceeds 1,000 amperes at 208Y/120 volts or 600 amperes at 480Y/277 volts.

7.5.10 Extensions

We will make extensions of primary service conductors to additional transformer vaults or pads and they will remain our property. For more information on these extensions, see Section 8.2.2

NOTES

8.0 MAINTENANCE OF CONDUCTORS AND DIVISION OF RESPONSIBILITY

This section specifies the points at which City Light's responsibility ends and beyond which the customer assumes full responsibility for maintenance and equipment.

8.1 General

You are responsible for:

All masts, brackets, conduits, and other service entrance equipment provided by you.

All equipment on the load side of the meter.

Any other equipment for which you are assigned responsibility in the service contract or other written agreements between us.

Special contract provisions, requirements, and exceptions are presented in the sections below.

8.2 Primary Underground Service

8.2.1 Division of Responsibility

For each installation of primary underground service, we will establish the point where our responsibility ends and your responsibility begins. All facilities on your side of this division point will be furnished, installed, operated, and maintained by you unless other arrangements are agreed to in writing.

8.2.2 Extensions of Primary Underground Service

Extensions to Additional Pads or Vaults. Any extensions of primary service conductors to additional transformer vaults or pads will be made by us and will remain our property. You, however, must furnish and install the primary conduit (as well as the vault or pad) and must pay the cost of the extension.

Extensions Beyond a Primary Meter. Extensions beyond a primary meter are your responsibility.

8.2.3 Transformers

Transformers connected to our primary distribution system will be furnished, installed, and maintained by us.

8.3 Primary Overhead Service

8.3.1 Division of Responsibility

If the installation of a primary overhead service is approved by us, we will establish the point where our responsibility ends and your responsibility begins. This division point will be identified prior to construction. All facilities on your side of this division point will be furnished, installed, operated, and maintained by you unless other arrangements are agreed to in writing.

8.3.2 Extension Beyond First Span

Any extension beyond the first span inside your property will be made by us and will remain our property. You, however, must pay the cost of the extension.

Maintenance of the extension will be performed by us at our cost.

8.3.3 Extensions Beyond Primary Meter

Extensions beyond a primary meter will be your property. If such extensions are made by us, you must pay the full cost of our labor and material. Maintenance of these extensions, which are customer owned, will be furnished by the customer at their own expense.

8.4 Poles

We will maintain all poles and anchors installed by us. We will not maintain service poles installed by the customer (such as those on mobile home lots).

8.5 Metering Equipment

We will maintain all meters, instrument transformers, and related equipment. See also Section 10.1.3.

8.6 Maintenance of Underground Conductors

For information about maintenance of underground conductors and conduit, refer to Department Policy and Procedure 500 P III-423, "Maintenance of Underground Conductors."

9.0 SERVICE TERMINATION POINT

Service conductors normally terminate at your meter socket, weatherhead, transformer vault or pad, handhole, or service terminal box. Consult your Customer Engineering Office should any question arise concerning the disconnect point or the point of division of responsibility.

9.1 Meter Sockets

General specifications for meter sockets are presented in Section 10. Special meter enclosure specifications for underground secondary residential service are presented in Section 6.6.2.

9.2 Enclosures

Specifications for current transformer and current transformer rated meter enclosures are provided in Section 10.7. Fault current limiter enclosures are discussed in Section 1.2.2.

9.3 Switchboards

Please see Section 10.0, Meters.

9.4 Handholes and Vaults

Please see Sections 7.4 and 7.5.

NOTES

10.0 METERING

10.1 General Requirements

10.1.1 Metering Voltages

- a. All low voltage metering shall be at the service voltage.

Exception: 480-volt services transformed to 120/208 or 120/240 for distribution in multi-unit buildings.

- b. All high voltage services (600 volts and above) shall be metered in accordance with Electric Utility Service Equipment Requirements Committee(EUSERC) standards. Contact our Account Executive office or the Technical Metering office for your service area.

10.1.2 Meter Sockets

You are required to provide a meter socket or current transformer loop as described in Sections 10.6 through 10.9. (See Construction Guideline DU 13-4 in the Appendix). The specific meter socket or enclosure shall be determined by the Technical Metering Section.

10.1.3 Utility Ownership of Equipment

Meters, instrument transformers, and associated metering equipment will be owned, installed, and maintained by us.

Customer-owned equipment such as meter sockets, enclosures, landing pads, conduit, and wiring must be installed and maintained by the customer.

10.1.4 Meter Wiring and Unrelated Wiring

Entrance wiring must be arranged so that metered circuits do not enter raceways or enclosures containing unmetered circuits. 'T' condulets are prohibited.

No power conductors are be allowed in instrument transformer secondary wiring circuits.

10.1.5 Seals and Locks

All metering equipment must be sealable and lockable as determined by the Technical Metering Section.

All enclosures containing unmetered conductors or busing must be sealable and lockable as determined by the Technical Metering Section.

10.1.6 Access

We reserve the right of access to your premises at all reasonable hours for the purpose of meter reading, inspection, testing, installation, removal, or replacement of our property. Access to our equipment must not be restricted by either permanent or portable materials of any kind.

Where access is limited, the Utility reserves the right to install a key box.

10.1.7 Termination

An Oxide inhibitor for stranded aluminum conductors is required for conductor termination. Oxide inhibitor must not be used on copper conductors, meter terminals or socket jaws.

10.1.8 Switchgear

When our metering equipment is to be installed in switchgear, drawings detailing the affected compartments and wiring diagrams showing sequence of compartments must be submitted to us for approval prior to manufacture. Metering provisions must conform to Electric Utility Service Equipment Requirements Committee (EUSERC) standards.

10.1.9 Reactive Power Metering

We may require a reactive power metering in accordance with the latest rate ordinance.

10.1.10 Cogeneration Rules

For metering requirements for cogeneration and small power producers (C/SPP), see the publication *Cogeneration and Small Power Producers Information*.

10.2 Sequence of Service Entrance Equipment

10.2.1 Service Under 300 Volts, Phase-to-Phase

General

- a. The sequence of service equipment for services metered with a socket-type meter and not requiring instrument transformers shall be meter, switch, fuse or circuit breaker.
- b. All services 225 amp or less shall have sockets with manual block by-pass provisions. See Section 10.6.4.

Group Installations

- a. The mainline switch may be installed ahead of the meters in group installations involving more than six individual occupancies, provided all equipment ahead of the meters have sealing provisions so that the Utility may use seals.
- b. See section 1.1.7 for information on unit identification.
- c. In multiple meter-socket installations which have a switch or breaker ahead of the meter, the breaker shall be of the common trip type (i.e., must open or close all ungrounded conductors simultaneously) constructed to prevent being changed to a non-common trip type.
- d. Where a meter is installed on the line side of the service entrance equipment, service conductors shall be continuous from the service connection point to the meter socket and shall not pass through any junction box, "T" condulets, entrance switch or overcurrent protection device. This does not forbid use of Utility sealable buses, wire troughs or current limiter enclosures on the line side of multimeter installations, if under Utility seal.

Current Transformer Metering. The sequence of service equipment for services metered with current transformers and/or potential transformers shall be instrument transformers with associated meters, switch, and then fuse.

Switchboards. On switchboards designed with a main circuit breaker, the subfeeds shall have the individual breaker on the load side of the meter or current transformers respectively.

10.2.2 Service of 300 to 600 Volts, Phase-to-Phase

General. The sequence of service equipment for services of 300 to 600 volts, phase-to-phase and 225 amperes or less, shall be meter socket (200 ampere Continuous Duty type Safety Socket) then Fused Switch or Circuit Breaker.

Switchboards For ganged sockets or switchboards with service voltage of 300 to 600 volts and 225 amps or less, the sequence of metering shall be Meter Socket (200 amp Continuous Duty Safety Socket) then Fused Switch or Circuit Breaker.

Note: A Master Switch or Main Breaker shall be allowed when needed to meet NEC requirements.

Current Transformer Metering The sequence of service equipment for services metered with current transformers and/or potential transformers shall be instrument transformers with associated meters, fused service disconnect.

10.2.3 Service Over 600 Volts

Services Over 600 Volts (considered high voltage) Contact your Service Engineering office, Account Executive office, or the Technical Metering office for your area.

10.3 Meter Location

10.3.1 Safe Location

You must provide a location for meters and metering equipment which is acceptable to us, readily accessible without risk of bodily harm to Utility employees, and which is free from vibration, corrosive atmosphere, and abnormal temperatures. The equipment must be protected from damage and must not be installed over stairs or steps, in or over stairwells. If mounted in a balcony or platform area, the area must be served by a permanent stairway.

Inside meter locations must have sufficient lighting to read meters and maintain equipment.

10.3.2 Small Structures

General Meters on residences, small commercial buildings, churches or single-metered complexes must be installed in an accessible location on the outside of the building

Any fenced or enclosed areas, which inhibit Utility employees from access during normal working hours, must be locked with a combination utility/customer core or double locked. A key box installed by us may also be used.

Removable Porches/Enclosable Meters. The meter location must not be under or over any type of structure which might be enclosed or removed in the future, such as a porch, deck, carport, stairway, etc., unless agreed otherwise in writing with the Utility.

10.3.3 Commercial and Industrial Structures

Large commercial and industrial metering must be installed outside unless an exception is agreed to in advance by us.

Meters may not be installed in commercial buildings above the first level or below the first basement level unless an exception is made by us.

10.3.4 Meters in Parking or Traffic Areas or High Vandalism Areas

When an outside meter location is to be in a parking area, the meter must be so located that parked vehicles will not restrict meter accessibility. Meters installed in an area where there may be vehicular traffic must be protected adequately to prevent damage.

For new or enlarged services where vandalism may result in damage to our metering equipment, we may require that you install protective enclosures or devices.

10.3.5 Multiple Meter Installations

On multiple meter installations, ringless-type socket covers shall cover only one socket.

Three Meters or Less. Multiple installations of three (3) meters or less must be outside.

Four Meters or More. Multiple installations of four (4) or more meters may be inside, provided the area or meter room is accessible during our normal working hours.

- b. Multiple installations located inside which are not accessible during our normal working hours, must have an outside door keyed to a combination Utility/Customer core.
- c. Where meter installations are located inside and outside access door is not possible and access during our normal working hours is not possible, we will install a key box or key boxes within close proximity to entrance and meter room doors.

Key Boxes

All new or enlarged services where access is limited must have key boxes provided and installed by us. You will be charged, in accordance with Departmental Policy and Procedures pertaining to installation charges.

All existing services where access is limited will, at our option, have a key box or key boxes installed by us.

Key box locations will be mutually agreeable to you and us.

10.3.6 Apartment Buildings

All multiple-unit dwellings shall have at least one meter for each dwelling.

Where common load exists, an additional house meter must be added.

All auxiliary (aux) dwelling units without separate metering and units found to have mixed loads or common loads will be held in the owner's account until mixed

loads have been corrected and verified by the Technical Metering Section.

The number of meter centers in apartment buildings shall not exceed one for three floors unless an exception is agreed to by us.

All meter room doors must have a Utility logo installed on the outside.

10.4 Clearances

10.4.1 General

All meters must be readily removable; i.e., not plastered-in or built-in. If installed in a recessed opening, the socket shall be can-trough type. The recessed opening shall be minimum of twelve (12) inches by twelve (12) inches with socket centered therein and not recessed more than eight (8) inches. Recessed meter sockets shall not be allowed except in public walkways, per EUSERC G-7.

10.4.2 Working Space (EUSERC STANDARD G-7-17)

- a. A level standing working space shall be provided and maintained in front of each metering installation. A clear and unobstructed working space shall be provided above this space per National Electric Code (NEC).
- b. The width of the working space shall be sufficient to permit ready access to the metering equipment and in no case less than three feet(3'). The height of the working space shall be equal to the overall height of the metering installation and in no case less than seven feet, one inch (7'1"). The working space shall extend at least three feet (3') in front of the surface on which the metering equipment is mounted and ten inches (10") from the meter center line to any obstruction such as walls or ceilings.

10.4.3 Group Installations

Group installations of meter sockets or trough assemblies shall be so arranged that the minimum vertical distance between socket centers is 10 inches (10") and the minimum horizontal distance is eight inches (8").

10.5 Meter Height

10.5.1 Meters Outside of Buildings

Except as otherwise stipulated by the Technical Metering Section, meter height shall be not more than seven feet (7') nor less than five feet (5') above the finished grade or floor below the meter. The center of the meter shall be the point of reference.

Current/Instrument transformer-rated meters shall not be higher than six feet (6') or less than

five feet (5') above finished grade or floor.

10.5.2 Height Over Walkways

Meter sockets may be recessed to the front edge of the meter socket. The meter height shall conform to 10.5.1.

10.5.3 Meters Inside Buildings

General:

Meter rooms will be the for sole purpose of electrical switchgear and metering equipment. Under no circumstances shall gasoline, diesel fuel, propane, paints, or any other noxious materials be allowed to be stored in these areas.

An area of six feet (6') minimum shall be maintained in front of all metering equipment.

When the meter location is inside buildings in an appropriate room, the meter socket center shall not be higher than seven feet (7') and not lower than two feet (2') above finished grade or floor immediately below the socket.

Exception. Current (and instrument) transformer-rated meters shall not be more than six feet (6') or less than five feet (5') above finished grade or floor.

10.5.4 Pedestal Metering

When the meter is installed in a pedestal which is detached from a building, the minimum height to the center of the meter shall be thirty inches (30"), maximum eighty-four inches (84"). The pedestal shall be sturdy enough for reasonable installation of meter without damage to the pedestal. Contact the Technical Metering Section for approval of proposed pedestal metering equipment.

10.5.5 Meters Outside Buildings

For single meter installation or a single or double row of meters, see 10.5.1.

For more than double row

Maximum height shall be seven feet and minimum height three feet six inches measured as in 10.5.1 above.

For enclosed meter installations, maximum height is eighty-four inches (84") and minimum of thirty inches (30").

For current transformer-rated metering, see 10.5.1.

10.6 "S" or Socket Metering

All self-contained meter sockets on services of 240 volts phase to phase or less shall have manual block by-pass.

All self-contained 225 amps (200 amp continuous duty) meter sockets on services between 300 volts and 600 volts phase-to-phase shall be manual block by-pass safety sockets.

10.6.1 Classification of Meter Sockets

Style 1. A 100-ampere meter socket of the round die-cast or pressed type. Style-1 sockets are limited to installations where the ampacity of the service entrance conductors, as rated by the National Electric Code, does not exceed 100 amperes. **These are not approved for new or enlarged services.**

Style 2. A 100-ampere meter socket, rectangularly shaped, and generally constructed of sheet metal. Style-2 sockets are limited to installations where the ampacity of the service entrance conductors, as rated by the National Electric Code, does not exceed 125 amperes. Conduit or cable connections may be made through top, bottom, sides, or rear of Style-2 sockets, provided the socket is designed for such connections. Manual Block Bypass provisions are required.

Style 3. A 200-ampere, 160-ampere continuous duty or a special socket, UL labeled for 200-amperes continuous duty. Where Style-3 sockets are used, the largest aggregate nameplate rating of fuse containers and/or circuit breakers used for service entrance equipment shall not exceed 225 amperes, except that for single family residences only, Style-3 sockets may be used where the size of the service entrance conductors, as rated by the National Electric Code, does not exceed 225 amperes. If approved Style-3 sockets require wrenches or other tools for the installation of the meter, then sufficient space around the socket must be left for the use of these tools. Manual Block Bypass provisions are required.

Style 4. A 150-ampere meter socket. Style-4 meter sockets may only be used for installations in which conductors and breakers do not exceed code requirements for 150 amperes. Manual Block Bypass provisions are required.

Style 5. A 400 ampere, 320 ampere continuous duty socket. **For use on residential 400 amp services only.** Manual Block Bypass provisions are required.

10.6.2 Mounting

Sockets must be mounted plumb and be securely fastened to the structure.

Can-Trough Sockets for Recessed Mounting. Only an approved can-trough type of socket design may be used if the socket is to be recessed in the building wall. (See 10.4.1)

Socket terminal jaws shall be recessed 1/2 inch below the seating point of the meter.

10.6.3 Openings and Drains

Unused threaded or knockout openings must be closed with an approved plug locked in place from the inside. Metering equipment enclosures shall be weatherproof if outside.

10.6.4 Circuit Closing Devices

We do not allow automatic or any "lever type" manual circuit closing devices of any type.

Note: Manual "lever type" circuit closing devices installed prior to the 1996 revision of this manual are allowed.

We allow only manual link by-pass block sockets.

10.6.5 Taps and Splices Taps and splices are not allowed in meter sockets.

10.6.6 Conductor Connection

Where aluminum conductors are used for service entrance, the meter socket terminals must be approved for use with aluminum and an oxide inhibitor shall be applied to the conductors. We require lugs with pressure plates under the screws.

The line side supply conductors to a meter must be connected to the top terminals, and the load side supply conductors shall be connected to the bottom terminals.

Where a socket-type meter is installed on the line side of service entrance equipment, the grounded conductor shall be grounded within the socket and in such a manner that removal of meter will not disconnect such grounded connection from grounded service conductor.

A single-phase, three-wire service of 225 amperes or less taken from any 208Y/120 or 480Y/277-volt system requires a five-terminal socket. The fifth terminal shall be at the nine o'clock position. A tap shall be connected from the neutral bus to the fifth terminal.

Three-phase four-wire services of 225 amperes or less require a seven-terminal socket. A tap shall be connected from the neutral bus to the terminal, second from the right, bottom row.

Four-Wire delta services shall have the orange leg connected to the right-hand terminal, top and bottom (see Standard DU 13-4, and Section 215-8 of the National Electric Code).

10.6.7 Meter Rings

Universal Application. Meter rings must be stainless steel and may be either screw type, toggle action type, or steel slip-lock type. Aluminum rings are not allowed.

10.7 Current Transformer Metering

10.7.1 General

Current transformer enclosures, landing pads, lugs, meter sockets, secondary wiring, conduits, other enclosures will be provided by and installed by the customer/contractor.

Current transformers are required on all services which exceed 225 amps ampacity.

Exceptions:

- a. 400 amp residential services using class 320 metering (Style 5).
- b. For purposes of remote metering on 225 amps or smaller services.

Note: Where current transformers are used for 225 amp or less remote metering, the customer must pay the additional costs of such installations.

High Voltage Metering. Where voltages are in excess of 600 volts between conductors, contact the Technical Metering Section for high voltage metering requirements.

10.7.2 Enclosures: Location, Mounting, and Wiring

Wiring Requirements. Current transformer cabinets must contain only main service conductors, metering equipment, and secondary wiring and must not be used as a junction box or gutter for the purpose of making taps, except as follows:

- a. Taps shall be permitted on the load side of the customers landing pads to accommodate emergency service, fire pumps, and elevator ventilation systems as dictated by Local/National Fire Codes.
- b. In a single-family dwelling, two connections shall be permitted on the load side of the current transformers. The customer shall provide approved terminal lugs.
- c. With the single exception of residential installations, all load conductors from a current transformer enclosure shall terminate either at a main disconnect switch or breaker or a UL labeled bus gutter rated at or above the service AIC (fault duty) rating.

Enclosure or Cabinet Cover. The cover of a current transformer cabinet (or of a current transformer compartment on a switchboard) shall be side hinged, have provisions for locks and/or seals as determined by the Technical Metering Section, and be removable. Permanent access shall be maintained which shall not block access to the enclosure nor block the cover from opening a minimum of 900 from the front of the cabinet. Hinges shall be permanent (welded or concealed) so that they cannot be disassembled from the outside of the cabinet and allow the cover to be removed while in the closed position. The meter connected to the associated current transformers may be mounted on the enclosure cover.

Location/Safe Access Current transformer enclosures must not be installed on or in ceilings, over stairways, or in any location that does not provide a safe working area in front of the enclosure. If the enclosure is mounted in a balcony or platform area, the area must be served by a permanent stairway. All current transformer enclosures shall be installed in an accessible location outside the building or in an approved electric meter room. The electric meter shall be located within sight of the current transformer enclosure. Exceptions may be granted by the Technical Metering Section.

Mounting Height The mounting height of the current transformer enclosure shall not be higher than eight feet (8') to the top of the enclosure, from the floor or platform. The mounting height of the current transformer enclosure shall be no lower than three inches (3") to the bottom on the enclosure, from the floor or working platform.

Note: If the enclosure is outdoors, the enclosure shall be of rain-tight construction and shall be a minimum of six inches (6") above grade. The maximum height of eight feet (8') to the top of the enclosure still applies.

10.7.3 Enclosure Specifications

Standards - The current transformer compartment of a manufactured switchboard shall comply with requirements set forth by the Technical Metering Section and EUSERC standards.

All services over 800 amperes shall have the current transformers mounted in the compartment of a manufactured switchboard.

Exception: Temporary services of over 800 amps but under 1200 amps may use a U.L. approved manufactured current transformer enclosure and applicable fault rated bus work built for the enclosure.

Sizes (Reference EUSERC, Section 300.) All current transformer installations of 800 amperes or less will require transformer landing pads. When landing pads

are used, they will be centrally mounted in the enclosure and the conductors will enter and leave through the ends or near the corners where allowed by EUSERC Standards or as shown in the Current Transformer Mounting illustrations in the Appendix.

The minimum size of enclosure shall be as follows:

For single phase current transformer services the minimum enclosure size shall be 24" wide by 48" long by 11" deep.

For three phase current transformer services the minimum enclosure size shall be 36" wide by 48" long by 11" deep.

Landing Pads

All landing pads shall be of heavy duty type with a minimum (AIC) fault duty rating of 50,000 amps rms symmetrical. They shall be UL labeled and built to EUSERC standards (SEE APPENDIX).

Note: 10,000 AIC rated landing pads shall no longer be approved.

Special Conditions Requiring Larger Enclosures

Conductor bends shall conform to the requirements of the National Electrical Code.

10.7.4 Secondary Wiring and Enclosure Requirements for Transformer-Rated Meters

Basic Conduit and Conductor Requirements

- a. The customer shall provide for the Utility's exclusive use a 1" minimum conduit between the metering enclosure and the meter socket or enclosure. The customer shall supply metering secondary wires, leaving six feet (6') of wire in the current transformer enclosure and two feet (2') of wire in the meter, socket, or enclosure.

Exception: If the metering enclosure and the meter socket are within switchgear and are less than ten feet (10') apart, the Utility shall provide the secondary wire.

Note: The customer shall provide all conduit runs and wire ways in switchgear.

- b. The customer shall provide (1) black, (1) red, (1) blue, and (1) white of number twelve solid wire and (1) black, (1) red, (1) blue and (1) white, number ten solid wire in each three phase secondary run.

The customer shall provide (1) black, (1) red of number twelve solid wire; and (1) black, (1) red, and (1) white of number ten solid wire in each single phase secondary run.

Note: If PVC conduit is used, a number twelve (#12) solid green ground wire shall be installed and connected at both ends using compression lugs.

Note: All secondary conduit runs of over fifty feet (50') shall be approved by the Technical Meter Section.

Sealing: All instrument transformer and meter enclosures shall be sealable and under the Utility's seals or locks.

Note: Junction boxes and condulets are not allowed in metering secondary runs.

Totalized Metering: Where totalized metering is permitted, the customer shall install the totalizing circuitry. Call the Technical Metering Section for installation information.

Socket-type Meters: When a socket-type meter is required, the approved socket shall be provided as shown in Construction Guideline DU 13-4.

10.7.5 Current Transformer Metering for Residential Services

General: Services larger than 400 amps single phase.

Exception: Where remote metering is necessary the customer may install current transformer metering on services of 400 amps or less. The current transformer enclosure shall be outdoors and accessible during normal Utility working hours. The customer shall pay additional labor charges for these installations.

Conduit: The service conduit shall enter directly into the current transformer enclosure.

Load Side Tap: On residential services only, the customer may feed directly into the individual panels main breaker.

Cabinet Clearance: When the current transformer enclosure is installed outdoors, it must be rain tight and have a minimum bottom clearance of six inches (6") above finished grade. (See 10.7.2)

10.7.6 Current Transformers in Transformer Vaults

With prior approval of the Technical Metering Section, the Utility's current transformers may be installed in transformer vaults under the following conditions:

- a. Service voltage 600 volts or less, phase-to-phase, and 2000 amperes or more of aggregate service capacity.

- b. The vaults shall be dry without the need for a sump pump.
- c. Personnel access shall be by a doorway and door locked with the Utility's lock.
- d. The bus duct and wire configuration shall make such an installation possible.
- e. The customer shall furnish and install metering conduit, conductors and fittings from the instrument transformers to a meter socket or cabinet as directed by the Technical Metering Section.

10.8 Metering on Switchboards

10.8.1 Multiple Self-Contained Metering

Clearance. The clear space around each meter socket shall not be less than one inch at top and side nor less than two inches at bottom.

Disconnect

- a. For services of 300 volts or less, phase-to-phase, the disconnect shall be on the load side of each socket.
- b. For services over 300 volts, phase-to-phase, the disconnect shall be on the line side of each socket (see Sections 10.2.1 and 10.2.2).

10.8.2 Current Transformer Metering

Clearance

Space requirements for a socket meter and test switch shall be 24 inches horizontal by 15 inches vertical. (See 10.5.1)

Access. Meters shall not be mounted on panels covering compartments which contain any customer's equipment that requires servicing. For further information contact the Technical Metering Section.

10.9 Metering for Swimming Pool Heater and Large Water Heater Loads

10.9.1 Load Limits

Self-contained metering of services for swimming pool loads and/or large water heaters (boiler) loads shall be limited to the following total connected loads:

37 kw at 208 volts single phase
43 kw at 240 volts single phase
64 kw at 208 volts three phase
74 kw at 240 volts three phase

Class 320 metering for these loads shall be limited to:
60 kw at 240 volt single phase.

10.9.2 Meter Sockets

Water heater loads shall be metered only with Utility approved meter sockets. They shall be UL labeled 225 amp/200 amp continuous duty sockets for 200 amp services and 320 class rated meter sockets (style 5) on residential 400 amp services where total connected does not exceed 320 continuous amps.

10.9.3 Large Loads

For loads in excess of the above, current transformer metering will be required.

NOTES

11.0 MOTORS AND SPECIAL LOADS

11.1 Advance Notice

Manufacture of special equipment and major construction may require up to 18 months' advance notice. Please refer to Section 1 for further information concerning advance notice requirements.

11.2 Motor Protection and Starting Limitations

11.2.1 Motor Protective Devices

It is your responsibility to provide suitable protective devices on all motor installations, including adequate protection against single phasing on polyphase motors.

11.2.2 Motor-Starting Limitations--General

Your use of electricity must not interfere with the quality of your own service or that supplied to other customers. If any motor causes interference with its owner's or a neighbor's electrical service, the owner of the motor is responsible for taking corrective action, as outlined in Section 1.2.2. Motor starting limits are presented in detail in the two following sections. Note: Meeting the requirements stated in the sections below does not assure that interference problems will not arise.

11.2.3 Limitations on Single-Phase Motors

Single-phase motors up to and including one-(1) horsepower rating may be operated by customers at any one of the single-phase service voltages. One-half horsepower or larger motors on recurrent starting with more than one start per hour, such as those operating water pumps, furnace blowers, etc., must be served at not less than 208 volts. Special written approval by us is required for single-phase motors larger than five (5) horsepower. Single-phase motors, one-half horsepower and greater, must not exceed the maximum locked rotor currents listed in Tables III and IV, unless approved in writing by us.

TABLE III

SINGLE-PHASE MOTOR MAXIMUM ALLOWABLE LOCKED ROTOR CURRENTS		
<u>Rate Size</u>	<u>At 208 Volts</u>	<u>At 240 Volts</u>
2 hp or less 3 hp 5 hp	72 amperes 100 amperes 149 amperes	62 amperes 86 amperes 129 amperes

TABLE IV

SINGLE-PHASE HERMETIC REFRIGERANT MOTOR COMPRESSOR MAXIMUM ALLOWABLE LOCKED ROTOR CURRENTS (Derived from NEMA Standards)			
<u>Unit Size</u>	<u>Motor Size</u>	<u>At 208 Volts</u>	<u>At 240 Volts</u>
2 ton	2 hp	80 amperes	69 amperes
2 1/2 ton	2 1/2 hp	100 amperes	87 amperes
3 ton	3 hp	120 amperes	104 amperes
3 1/2 ton	3 1/2 hp	140 amperes	121 amperes
4 ton	4 hp	160 amperes	138 amperes
4 1/2 ton	4 1/2 hp	180 amperes	156 amperes
5 ton	5 hp	200 amperes	173 amperes

11.2.4 Limitations on Polyphase Motors

Approval. The following information must be submitted to us in writing when approval for motor service is requested:

- Address of installation
- Motor horsepower
- Voltage

- d. Number of phases
- e. Locked rotor current guaranteed by the manufacturer or by test
- f. Type of driven load
- g. Maximum number of starts per 8-hour period
- h. Type of starting device
- i. Horsepower rating of the largest motor in a group.

Starting Limitations. Reduced starting current shall be required on all motors exceeding 15-horsepower nameplate rating, unless otherwise agreed to by the Utility. The customer shall furnish details of motor characteristics for all motors larger than 15 horsepower at which time the Utility will determine the maximum allowable starting current for a given installation. Across-the-line starting of the customer's motors of 15 horsepower and less will normally be permitted. When the locked rotor current of a motor exceeds the value listed in Table V or the motor will be started more frequently than one start per hour, the Utility may require the use of a suitable starting device to limit the starting current. Upon failure to install the required starting device, the Utility shall disconnect the service. Reconnection shall be at the customer's expense.

TABLE V

POLYPHASE MOTOR MAXIMUM ALLOWABLE LOCKED ROTOR CURRENTS (Derived from NEMA Standards)			
<u>Rated Size</u>	At 208 Volts <u>3-phase</u>	At 240 Volts <u>3-phase</u>	At 480 Volts <u>3-phase</u>
2 hp or less	55 amperes	48 amperes	24 amperes
3 hp	71 amperes	61 amperes	31 amperes
5 hp	102 amperes	88 amperes	44 amperes
7 1/2 hp	140 amperes	122 amperes	61 amperes
10 hp	179 amperes	155 amperes	78 amperes
15 hp	256 amperes	222 amperes	111 amperes

Starters in Group-Installations. The maximum permissible current values in Table V apply to an installation of a single motor. Starters may be omitted on smaller motors of a group installation when their omission will not result in a starting

current in excess of the starting current approved in writing by the Utility for the largest motor of the group.

11.3 Noninductive Loads

11.3.1 Interference

Noninductive loads must comply with the interference correction rules stated in Section 1.2.2.

11.3.2 Maximum Switched Load

The maximum increment of load to be switched as a unit shall be: 100 kilowatts, three-phase; or 30 kilowatts, 240 volts single-phase, without written approval from the Utility. Loads in excess of these amounts may require the customer to furnish and install special switching equipment to reduce the magnitude of unit loads to be cycled on and off.

11.4 Welding Equipment

Welding equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA).

11.5 Minimum Power-Factor Limitations

11.5.1 Lighting

Low Power-Factor Lighting, such as neon, mercury vapor, and fluorescent must have suitable auxiliary equipment to provide a power factor of not less than 95 percent lagging at the meter location.

11.5.2 85 Percent Minimum

Unless other arrangements are made in writing, the Utility will not be obligated to deliver electric energy at any time at a power factor below 85 percent. This figure refers to the monthly average overall power factor for each individually metered service.

11.5.3 Capacitor Control

Capacitors installed by the customer for power-factor correction must be switched by automatic means so that the capacitors will be switched off during periods of reduced load.

11.6 Special Voltage Requirements

Transformation to other than the available service voltage shall be furnished by the customer on the load side of the Utility's metering equipment, unless otherwise agreed to in writing.

11.7 Meter Requirements for Large Loads

For meter requirements for large loads, refer to Sections 10.1.8 and 10.7.

12.0 DOCUMENTS

NEC - National Electric Code published by:

National Fire Prevention Association
Battery March Park
Quincy, MA 02269

EUSERC - Electric Utility Service Equipment Requirements Committee published by:

City of Los Angeles
Dept. of Water and Power
P.O. Box 111
Los Angeles, CA 90051

The following documents are available for customer review at the North and South Service Centers and in the Downtown City Light offices. We will supply construction standards charging customers according to Distribution Engineering Policy and Procedures, 812.190.

This is a partial list of Department policies which affect customer service installations. All are public records which are available upon request.

DPP 500 P III-131 "Distribution and Service Easements"
DPP 500 P III-132 "Use Permits, Consents, and Easements"
DPP 500 P III-401 "Charges for Specialized Electrical Service and Equipment"
DPP 500 P III-412 "Cogeneration and Small Power Production Facilities"
DPP 500 P III-413 "Resolving Customer Electric Service Problems"
DPP 500 P III-415 "Assignment of Labor Charges"
DPP 500 P III-416 "Current Diversion"
DPP 500 P III-417 "Installation Charges"
DPP 500 P III-420 "Power Factor Metering and Billing"
DPP 500 P III-421 "Voluntary Conversions to Underground Service"
DPP 500 P III-422 "Final Connection Cost for Contractor-Installed Services"
DPP 500 P III-423 "Maintenance of Underground Services"
DPP 500 P III-424 "Trenching in the Public Right of Way"

GLOSSARY

NOTE: These brief definitions of technical terms are presented to help the reader understand the handbook. If you have any questions about terms or regulations, please call Customer Engineering (684-4990, North of Denny Way; 368-1600, South of Denny Way).

Ampacity - Current carrying capacity measured in amperes.

Associated Equipment - In discussions of metering equipment, the term includes the meter socket, instrument enclosures, test switches, and other equipment.

Cabinet - An enclosure designed for surface or flush mounting and provided with a frame, mat or trim, and swinging doors. Cabinets are usually employed to contain panel boards.

Collector Bus - A device that connects the Department's service conductors to the customer's service entrance conductors.

Commercial - Use of electricity by a customer in other than a single-family residence or duplex.

Conduit - A UL labeled wireway with a smooth interior surface that permits easy drawing in of the electric conductors.

Customer - Any person, firm, corporation, government agency, or other entity that uses, has used, or has contracted for electric service from the Utility.

Department - The Seattle City Light Department. Also called the Utility

Direct Burial - The installation of electric conductors in a trench without the use of a conduit. (Not allowed in new installations.)

Easement - See Service Easement.

Electric Service - All service conductors (primary and secondary), transformers, and distribution system equipment for delivering electric energy from the Utility's supply system to the wiring system of the premises.

Far side Service - Service where the Utility's distribution system is located on the opposite side of a public street, thoroughfare, or right-of-way from the customer's premises.

Fault Current Maximum - The highest current a customer may expect to be supplied from the Utility's system to his equipment (switchboard) during a bolted fault.

Ground Rod - An approved metal rod or pipe placed in the ground to which electric connection can be made in order to maintain earth potential on equipment.

Group Installation - An installation which includes more than one electrical device, such as panels, meters, motors, etc., connected together by a common electric circuit.

Guying Facility - Cables or braces used to relieve stress on masts and poles.

Handhole - A permanently installed protective enclosure (usually below grade), which is used for gaining access to electrical conductors for the purpose of pulling, splicing, or terminating.

Hertz (Hz) - A unit of frequency equal to one cycle per second; refers to the frequency of alternating current.

High Leg - The phase leg that is at higher potential/voltage to ground than the other two-phase legs.

Industrial - Use of electricity for manufacturing, processing, refining, or freezing.

Instrument Transformer - Current and/or potential transformers used in connection with metering and control devices.

Keybox - A permanently installed, locked box with keys enclosed. Keyboxes allow City Light personnel to gain access to a customer's premises for the purpose of reading, installing, servicing, or removing Utility meters and electric equipment.

Line Angle Structure - A corner pole of structure on a dock where the dock and distribution system change direction.

Load Center - The equipment which is the main control used for disconnecting the customer's electric service. This equipment includes circuit breakers, fuses, or switches located near the entrance of the supply conductors.

Local Improvement District - LID - A project undertaken by property owners within a specific geographic area inside Seattle to accomplish a specific improvement project.

Locked Rotor Current - The steady-state current drawn by a motor with the rated voltage and frequency applied and the rotor locked in a stationary position. This is the maximum current the motor will draw.

Mandrel - A tapered or cylindrical spindle inserted into and pulled through the distance of the installed conduit run for clearing the conduit of foreign material.

Master Meter - Any single meter that measures the electrical consumption of all units or subdivisions of a building.

Meter Socket - A receptacle for the installation of an electric meter.

Metering Equipment - Any equipment used to measure electrical energy.

Motor Protective Device - A device responsive to motor current and temperature that protects the motor against dangerous overheating due to overload, failure to start, or single-phasing (in the case of three-phase motors).

Motor-Starting Limitations - Limits placed by the Utility on maximum starting current for electric motors.

Multiple Dwelling Building - Any building or any portion of the building which contains three or more dwelling units, which are occupied and have provisions for living, sleeping, cooking, and sanitation.

Network - An underground distribution system serving high density loads.

Neutral - The grounded conductor in a single-phase, three-wire or three-phase, four-wire system. The identified conductor that is at zero potential/voltage to ground.

Noninductive Load - An electrical load which consists entirely of resistance.

Oxide Inhibitor - A compound used to retard oxidation on electrical connections where aluminum conductors are used.

Pedestal - A free-standing structure used exclusively to support or contain electrical metering equipment and/or customer service equipment.

Point of Attachment - The point at which the Utility's service conductors are attached to a structure by an approved service bracket.

Power Factor - The ratio of true power (kilowatts) to the apparent power (kilovolt-amperes) for any given load and time.

Primary Service - Service voltage greater than 600 volts.

Public Right-of-Way - Lands set aside and designated for use by the general public for common access and Utility functions, such as streets, alleys, boulevards, and walkways. See Public Street, below.

Public Street - Land acquired and/or dedicated by or to a governmental agency for public use, for general public access and utilities. Public right-of-way includes any land open to the public that the city owns or controls through easement. Street right-of-way includes all property from the street center to the adjacent property line, including planting areas and sidewalks.

Private Property - Land owned in fee-simple title by an individual, individuals, or corporations.

Residence - A single-family dwelling.

Road Improvement District - RID - A project undertaken by property owners within a specific geographic area outside Seattle to accomplish a specific improvement project.

Salvageable - Materials having a value to the Utility.

Secondary Service - Service voltage of 600 volts or less.

Service Bracket - Approved insulators installed by the customer to provide a mechanical termination for the overhead service wires from the Utility's distribution system to the customer's structure.

Service Conductors - Conductors extending from the Utility's distribution system to the point of service connection at the customer's property or facility.

Service Contract - An agreement between the customer and the Utility.

Service Drop - The overhead conductors from the Utility's pole to the customer's point of attachment.

Service Easement - A right acquired by the Utility to construct, operate, maintain, reconstruct, and alter overhead or underground electric facilities on private property (including property owned by another public agency).

Service Entrance Equipment - Service conduit, conductors, weatherhead, meter base, and load center.

Service Lateral - An underground service tap from the Utility's distribution system to the customer's point of service connection.

Service Mast - The conduit above the meter used to provide mechanical protection for the customer's service conductors and to support the service drop from the Utility's distribution system.

Service Pole - A pole necessary to provide adequate clearance and support of the service drop.

Service Stub - An underground service lateral installed to the customer's property for future use.

Service Terminal Box - A metal box used exclusively to terminate the

Utility's service laterals and provide a connection to the customer's service entrance conductors.

Span - A length of conductor or cable between supports.

Splicing Vault - A concrete chamber in an underground system which the Utility's workers may enter for the purpose of installing and maintaining electrical equipment. A splicing vault does not contain transformers.

Switchgear - The switches, fused switches, or circuit breakers used for disconnecting an electrical circuit.

Temporary Service - A customer's temporary service panel energized by the Utility on a temporary basis.

Underground Residential Area - A residential area supplied by an underground distribution system.

Utility - The Seattle City Light Department

Vault - An approved chamber for electric equipment. Vaults must meet City Light's construction requirements.

WAC - Washington Administrative Code.

Working Platform - A safe, clear, unobstructed floor area with safe access to all electric equipment, protected according to WAC Standard 296-24-75007.

Working Space - An area free of any obstructions in front of meters, service panels, and electric equipment for providing safe access to install, remove, or repair all electrical devices. A safe working space must meet the requirements of the National and City Electrical Codes.

NOTES

APPENDIX

This section contains City Light Construction Guidelines and metering equipment requirements that may have been revised since this manual was published. Please contact your Electric Service Consultant or Account Executive for the latest revisions of these guidelines.

The following guidelines and illustrations are those which were in effect at the time this manual was revised. All of the guidelines and illustrations are subject to revision and our customers and contractors must check to ensure that they are using the current issue when installing service.

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